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Innovative Trends: Virtual Reality and Augmented Reality

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Outline

- **Introduction**
- Technologies usage
- Available Virtual Reality Devices
- VR/ AR Application Development KITS
- The Future of Virtual Reality

Introduction

- Currently we live in a time where technology progresses at a fast pace, where new trends and technological revolutions appear and influence our lives.
- The new trend in business, training, gaming and mobile applications is going AR or VR.
- We will be discussing these main points in the following presentation:
  - What is AR and VR?
  - Key differences between the two technologies.
  - Their use in our society.
  - VR/AR devices
  - The future of VR and AR.

Augmented Reality

- Augmented Reality is a technology that strives to modify and enhance the reality by combining the real physical environment with digital elements.
- AR not only adds digital elements to the real world but also lets you interact with them.
- The interaction is usually done with mobile devices like smartphones or Smartglasses.

[1].Microsoft HoloLens 2 Smart Glasses

Virtual Reality

- Virtual Reality technology concentrates its efforts on immersing a person in a computer-generated world.
- VR applications are defined by immersion. This is a measure on how much the user feels that he is present in the virtual world.
- With VR the user can also interact, modify or create objects in the computer simulation. The interaction is done with special VR developed headsets.

[2]. Oculus Quest 2

Augmented Reality vs Virtual Reality

[3]. Augmented Reality Technology and Trends

VS

[4]. Virtual Reality Art

Key differences between the two technologies.

- Augmented Reality
  - Is focused on enhancing the physical world.
  - High portability, can be used outdoors and indoors.
  - Ready to use with own smartphone without the need of additional devices. Or with dedicated AR Smartglasses
  - Smartglasses performance do not depend on external devices.
- Virtual Reality
  - Creates a new fully digital world that sometimes resembles reality.
  - Mostly used indoors, connected to pc or wireless.
  - VR applications require a dedicated VR devices, connected to PC or mobile. Or stand-alone VR headsets
  - The VR devices rendering and immersion quality are highly connected with the performance of the mobile or PC specifications.

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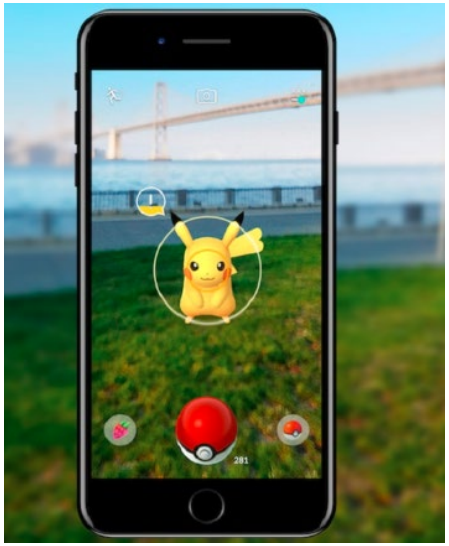
Augmented Reality usage

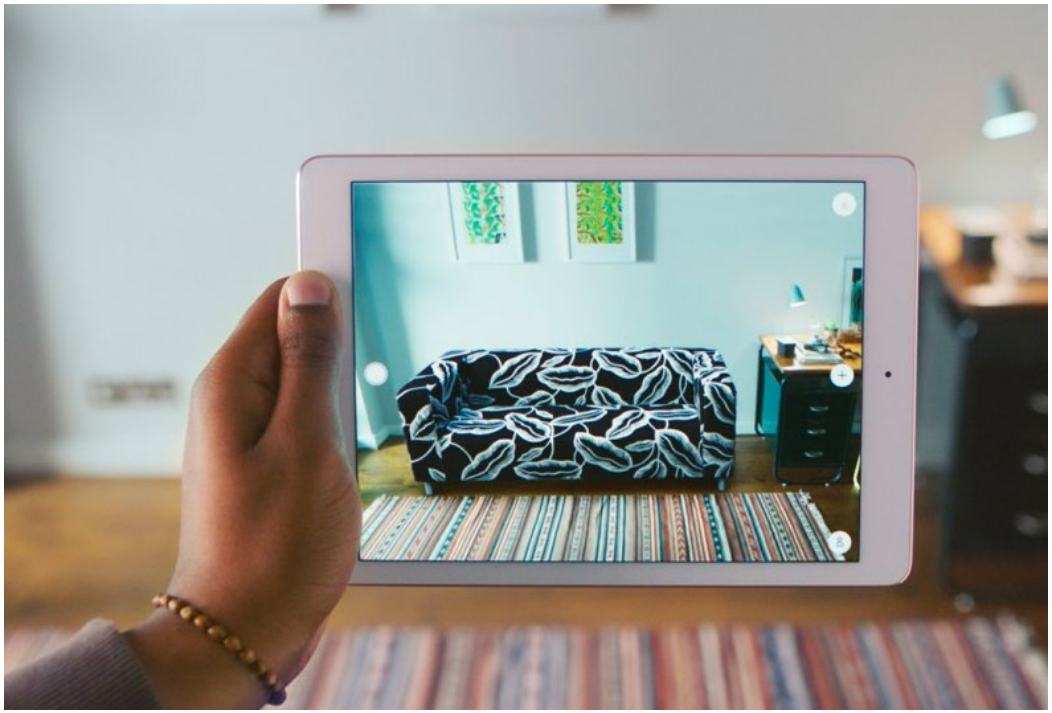
- One popular use, and most known by consumers of AR technology are games.
- The famous game Pokemon Go is a perfect example of AR implementation in mobile games by integrating GPS location and software with AR technology to create a game that partially interacts with physical world.



[5]. Pokemon Go

Augmented Reality usage

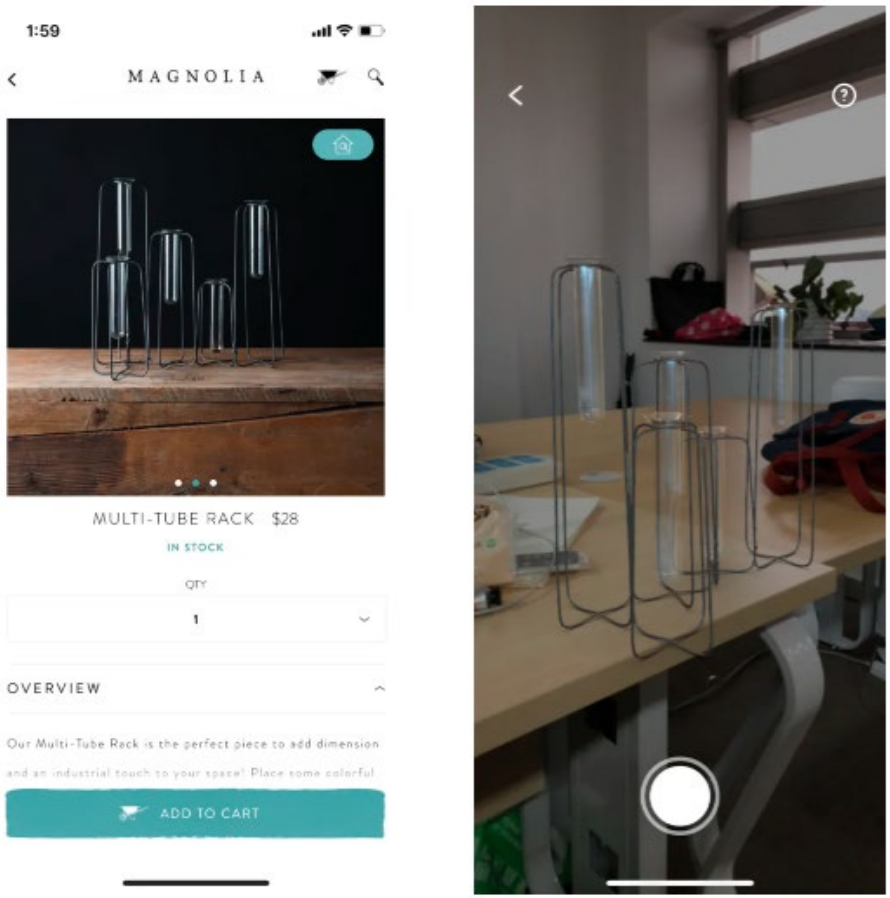
- A new trend emerging is related to using AR for online shopping. One example is IKEA AR app that allows the buyer to see how the furniture fits in their apartment before purchasing it.



[6]. IKEA AR APP

Augmented Reality usage

- Pottery Barn(left) and Magnolia(right). AR Applications.



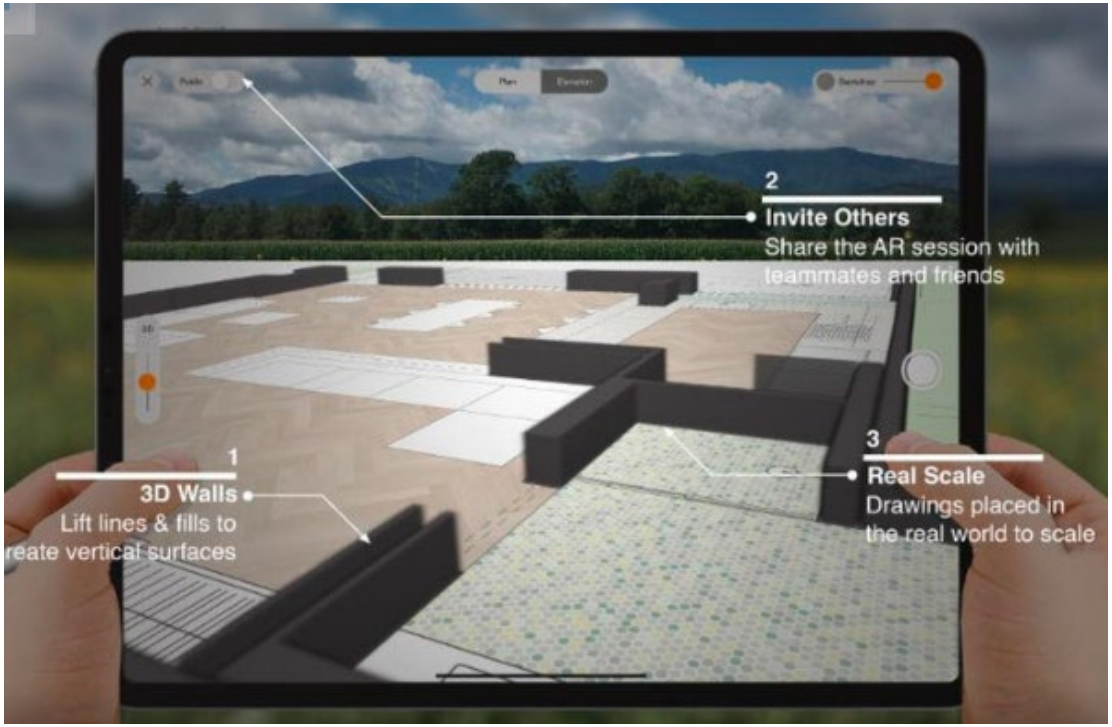
Augmented Reality usage

- Architecture is another domain that greatly benefits from AR technology. With the help of AR 2D schematics can be represented in an understandable 3D building.
- Augment is such an application designed for representing schematics as 3D model holograms

[7]. Architecture AR apps

Augmented Reality usage

- Morpholio AR Sketchwalk, is an application that lets the architect walk around the real-world site and draw structural related objects. This allows the clients to have a better idea of the result.



[7]. Architecture AR apps

Virtual Reality usage

- In the last years VR technology became increasingly known over the world due to its marketing as a gaming device that permits the user to experience a new reality build in the digital world.

[8]. Apple VR patent

Virtual Reality usage

- Excluding its gamming capabilities, VR has been long used and researched as a training simulator for pilots, military, health or motor industry.

[9]. VR Flight Simulator

Virtual Reality usage

- VR ability to immerse the user in the digital world is an assets that allows the execution of different training procedures that could be harmful for the user.
- In health, the VR simulators are mostly used for training new surgeons for various types of standard operations or difficult ones that could endanger the patient if mistakes occurs.

[10]. Fundamental VR

Virtual Reality usage

- Industrial VR training simulators are another branch that is researched due to its ability to train new personnel at a relative low-cost and no machinery or property damage caused by trainee mistakes.

[11]. Industrial VR Training

Virtual Reality usage

- Until recent years VR has been a technology that tend towards creating industrial, military or surgical simulators.
- Now, because its increase portability and performance, VR is gaining ground in the gaming industry as a new type of console. This new market segment allowed it to become a popular topic amongst the general consumer and started a new trend in the digital era.

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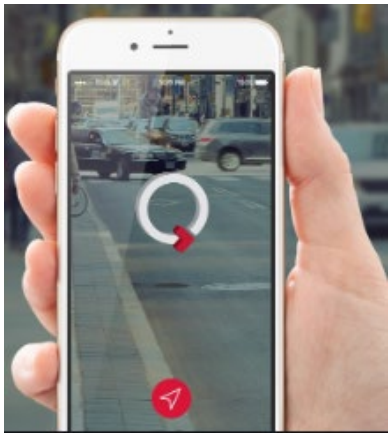
VR/AR devices

- AR technology is supported in general on the next types of devices:
  - Smartphones.
  - Tablets.
  - Smartglases.
- The most affordable way to experience the AR world is with your own smartphone, as AR is implemented in mostly mobile applications.



VR/AR devices

- Smartglases are a new type of device that renders the augmented reality traits in front of your eyes. Newer types of smartglasess can display realistic holograms into the background with sound effects.
- Popular models that are developed belong to:
  - Google-Glass Enterprise Edition
  - Microsoft-HoloLens
  - Everysight-Raptor.
  - Epson-MOVERIO BT-300
  - Vuzix-Blade Smart Glasses

[12]. Saturn Holotour

VR/AR devices

- Virtual reality technology currently focuses in general on three types of devices:
  - Smartphone dependent headsets
  - Standalone headsets
  - PC-tethered headsets

- VR headset for mobile have a slot where you insert the supported phone type and download VR mobile applications.

VR/AR devices

- Virtual Reality Headsets for PC presents the best experience the user can have in VR.
- It comes with a body tracking system and controllers that mimic the real-life movement of the user and transpose it in the game.
- It can have an overall better performance due to its dependency on innate device and PC hardware.

VR/AR devices

- Stand alone VR devices do not require and active pc tethered connection or a smartphone inserted. They have their own battery and own hardware to run the games on.
- One downside is their low uptime due to the battery of only a couple of hours. Another downside compared to the PC or desktop version is their low storage capacity and lower processing power.

VR/AR devices

- Popular VR PC models include:
  - Oculus Quest
  - Oculus Rift
  - PlayStation VR
  - HTC VIVE Cosmos Elite
- Smartphone and stand-alone VR headsets models:
  - Oculus Go
  - Samsung's Gear VR
  - Google Cardboard
  - Zeiss VR One Plus

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VR/ AR Application Development KITS

- AR applications are usually targeted for portable devices, like smart glasses, mobile phones available directly on browsers.
- Some popular SDK that help you develop an AR application are: ARKit, ARCore, Wikitude AR SDK, Vuforia AR SDK, AR.js, Lumin, Layar SDK and others.
- As they are SDK, they need an IDE that can work with them and the most popular of them being Unity followed by Xcode, Android studio, Unreal Engine and Visual Studio.

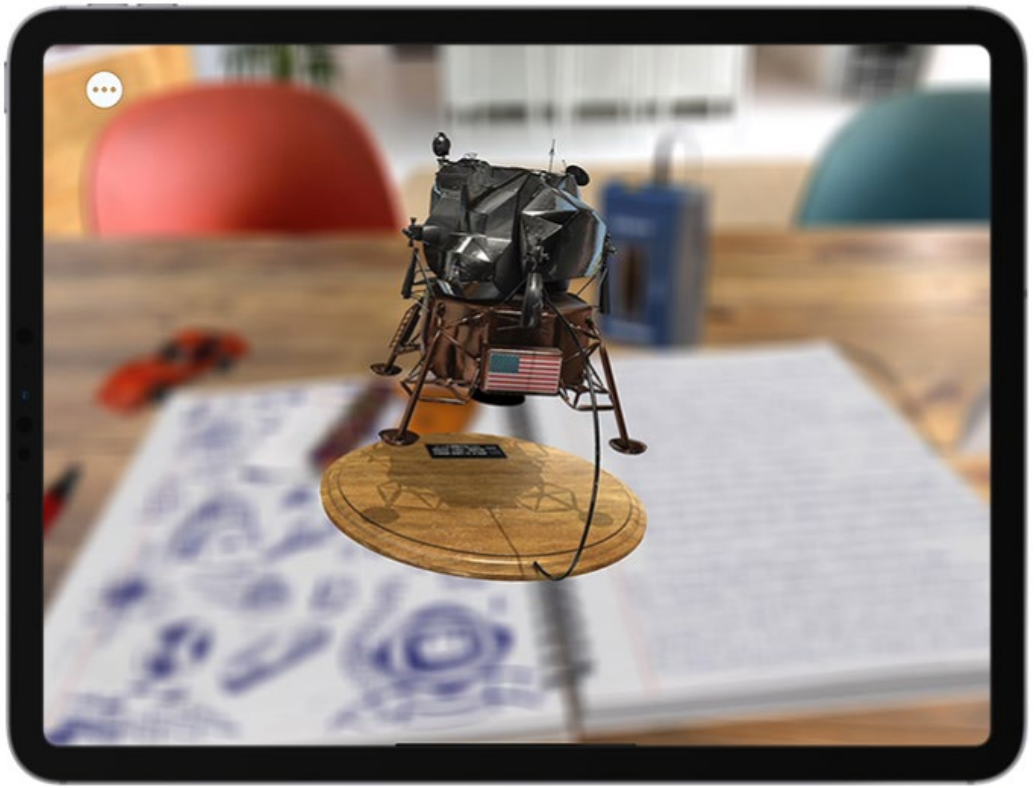
VR/ AR Application Development KITS

- Unity is the most popular platform in use for indie Game Development due to its availability and compatibility with all platforms and most of the SDK.
- Xcode is Apple's own IDE solution that can be used with ARKit for iOS AR development.
- Android Studio it's a robust IDE for targeting the android OS for AR applications.

VR/ AR Application Development KITS

Apple ARKit key features:

- Suports iOS and Mac OS.
- Location Anchors.
- Depth API.
- Expanded Face Tracking.
- Quick Look function(view 3D objects in real world).

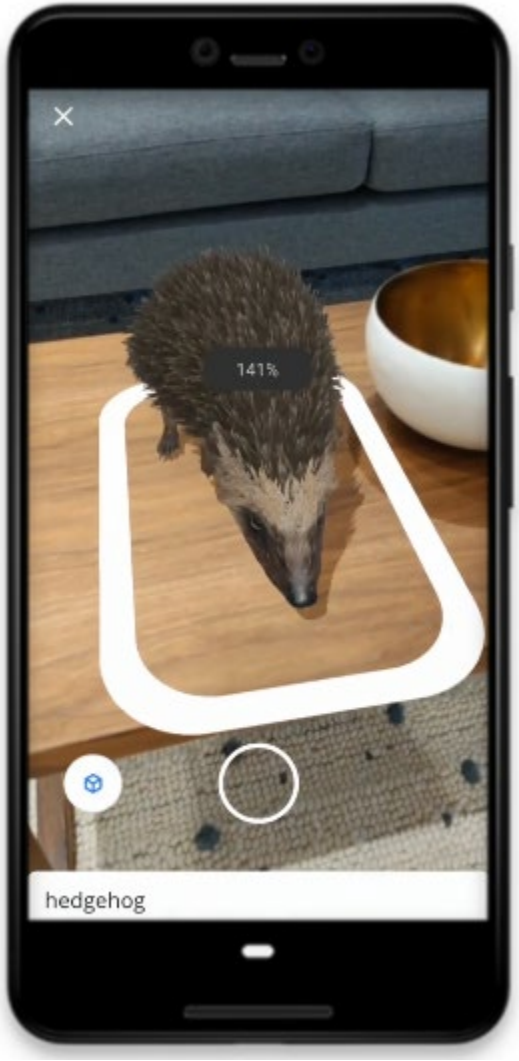


[13]. ARKit

VR/ AR Application Development KITS

Google ARCore solution features:

- Cloud Anchros.
- Depth.
- Environmental HDR.
- Motion Tracking.



[14]. ARCore

VR/ AR Application Development KITS

Wikitude key features:

- Object & Scene Tracking.
- Instant Tracking.
- Geo AR.
- Cloud Recognition.
- Multiple Object Tracking.

15. Wikitude AR Kit

VR/ AR Application Development KITS

VR applications target multiple platforms like mobile phones, PC desktops with connected VR headsets or stand alone wireless VR headsets.

Tools for developing VR applications:

- Unity3D-IDE.
- Unreal Engine-IDE.
- Cry Engine-IDE.
- Blender-3D object modeler.
- 3DS Max & Maya-3D object modeler.

VR/ AR Application Development KITS

- In order to work with the previous IDE, SDK are required.
- The SDK's are specific to the device that you target :
- HTC Vive / OpenVR SDK.
- PlayStation VR / PSVR dev kit.
- Oculus Rift / Oculus SDK.
- Samsung Gear VR / Oculus Mobile SDK.
- Google VR SDK.

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The future of AR

- Currently AR applications are widely on smartphones to provide more insight on the specific data related to places, objects or data.
- It can help people visualize better the navigation instructions, transform 2D schematics in a 3D model or aid you in making an important decision if the IKEA table fits in your room.
- AR still has a long way to go with Smartglasses as they are currently unaffordable for the general audience and a balance needs to be found between performance and price.
- In the future we can expect to see life-like holograms displayed in our real psychical world that we can interact with.

The future of VR

- Currently VR devices have seen an increase popularity and acceptance due to improved performance, mobility tracking and rendering capacities.
- The quality of desktop VR devices are outstanding and its steadily rising, along with improved tracking and mobility.
- There are several problems with VR, one important one that is VR sickness, a problem that can be ameliorated with different environmental developing techniques.
- For the general audience VR can be expected to become the latest trend in gaming and socializing due to its immersive nature and captivating virtual environments.

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